UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

VTT TECHNICAL RESEARCH CENTRE OF FINLAND LTD., Plaintiff, vs. **SITIME CORPORATION,** Defendant.	CASE NO. 4:19-cv-1174-YGR **CLAIM CONSTRUCTION ORDER** Re: Dkt. Nos. 44, 45, 63

Plaintiff VTT Technical Research Centre of Finland Ltd. ("VTT") brings this patent infringement action against defendant SiTime Corporation ("SiTime"), alleging that SiTime infringes U.S. Patent No. 8,558,643 (the "'643 Patent"), titled "Micromechanical Device Including N-Type Doping for Providing Temperature Compensation and Method of Designing Thereof." Now before the Court are the parties' claim construction disputes.

Having carefully considered the papers submitted, the parties' arguments presented at the claim construction hearing on May 15, 2020, and the pleadings in this action, and for the reasons set forth below, the Court hereby adopts the constructions set forth herein.

I. BACKGROUND

The '643 Patent is directed to temperature control of resonators (and other micromechanical devices). ('643 Patent at 1:8-9.) Resonators are structures that vibrate (or oscillate) at a precise frequency. (Dkt. No. 44-5 ("SiTime Prospectus") at 2.) When combined with another circuit that sustains the resonator's vibration, the components form an oscillator that can be used to provide clock signals in a system. (*Id*; Dkt. No. 45-5 ("Nguyen Decl.") ¶ 17.) For

example, a computer might have oscillators to provide clock signals that synchronize the CPUs, communication chips, and other components. (SiTime Prospectus at 2.)

Traditionally, resonators have been made out of quartz crystal. (*Id.* at 3.) However, quartz crystal suffers from several limitations, including narrow frequency range, sensitivity to shock, and limited programmability. (*Id.*) For this reason, electronics manufacturers have been trying to replace quartz crystal with semiconductor-based "microelectromechanical systems" (MEMS). (*Id.* at 1; '643 Patent at 1:17-19.) MEMS resonators have greater programmability and may be advantageously manufactured using scalable fabrication techniques. ('643 Patent at 1:15-19; SiTime Prospectus at 3.)

One challenge preventing widespread adoption of MEMS resonators is "temperature drift." ('643 Patent at 1:19-22, 1:29-31.) In order to keep time accurately, resonators need to oscillate at a stable frequency in the face of changing environmental conditions. (*See* SiTime Prospectus at 2.) Silicon-based resonators, however, have a resonance frequency that fluctuates due to ambient temperature. ('643 Patent at 1:19-26.) Temperature drift stems from changes in material stiffness as temperature increases. (*Id.* at 1:22-24.) When temperatures increase, silicon becomes less "stiff" and thus vibrates at a lower frequency. (*Id.*; Nguyen Decl. ¶ 19.)

A known technique for reducing temperature drift involves "doping," or adding an impurity ("dopant") to silicon. (*See* '643 Patent at 1:61-2:2.) The prior art attempted to use n-type (negative charge) and p-type (positive charge) dopants, as well as combined layers of p-doped and n-doped materials, to reduce temperature drift. (*Id.* at 1:61-2:43; Nguyen Decl. ¶ 20.) However, these techniques failed to achieve temperature compensation over sufficiently wide temperature ranges. ('643 Patent at 2:47-48.) Moreover, the inventors of the '643 Patent found that even at optimal doping levels, constant doping concentration fails to achieve stable frequency. (*Id.* at 15:4-25, Figs. 16a-c.)

To improve the prior art, the '643 Patent proposes a "novel temperature compensated semiconductor structure whose temperature sensitivities can be managed . . . over a wide temperature range." ('643 Patent at 2:52-55.) The invention of the '643 Patent lies in a MEMS

device that has a drive or sense means coupled to a resonator[1] with "at least two regions having different materials properties." (*Id.* at claims 1, 29.) The material properties of the regions and their relative volumes "define an effective material having the desired temperature compensation characteristics." (*Id.* at 2:63-66.) Specifically, each region comprises one or more n-type doping agent, and the type of doping agent, its concentration, and the crystal orientation are "configured so that the temperature sensitivities of the generalized stiffness are of opposite sign at least at one temperature" for the regions. (*Id.* at 2:66-3:7, claim 1.) As a result of this configuration and the relative volume, the overall temperature drift of the generalized stiffness is 50 ppm or less over 100 °C. (*Id.* at claims 1, 29.)

The invention works as follows: when silicon is "doped" with another material, its temperature sensitivity—the extent and direction in which its frequency or stiffness changes due to temperature at a given point—changes. (*See id*. at 6:23-25, 15:4-9, Figs. 15a-c.) By adjusting dopant types, concentrations, and crystal orientation, the regions can have opposite temperature sensitivities, so that one region has increasing frequency as temperature increases while another region has decreasing frequency. (*Id.* at 3:16-60, Figs. 2a-2b.) Additionally, by changing the volume, the regions' weight on the overall elasticity can be adjusted. (*Id.* at 12:44-67.) Thus, by configuring these factors, the resonator can be designed so that the effects of temperature "cancel out" among the regions and the overall temperature behavior of the composite material is the weighted average of the constituents.[2] (*Id.* at 6:23-33, 15:26-30, Fig. 2c.) In this way, an effective material with low temperature drift can be achieved. (*Id.* at 15:20-25.)

Independent claim 1 recites:

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[1] The claims recite a "semiconductor element capable of resonating or deflecting," which presumably includes, but is broader than, a resonator. (*See* '643 Patent at claims 1, 29.)

[2] The specification describes implementing the invention in a "superlattice" structure where regions with different dopant concentrations are stacked. ('643 Patent at 4:1-15, 7:15-11:50.) However, the specification makes clear that "other layer configurations can be used too, provided that they form a coupled spring system and the slopes of the temperature sensitivities suitably match at each point of the desired temperature range." (*Id.* at 12:25-30.) Even without a lattice structure, "the general approach of cancelling positive/negative temperature coefficients (of first and higher order) with suitably selected dopant concentrations and relative volumes, and, possibly, suitably selected arrangement of the regions, is still applicable." (*Id.* at 13:25-44.)

1. A micromechanical device comprising;

> a semiconductor element capable of deflecting or resonating and comprising at least two regions having different material properties,
>
> drive or sense means functionally coupled to said semiconductor element,
>
> wherein
>
> > at least one of said regions comprises one or more n-type doping agents,
> >
> > the relative volumes, doping concentrations, doping agents and/or crystal orientations of the regions being configured so that
> >
> > > the temperature sensitivities of the generalized stiffness are opposite in sign at least at one temperature for the regions, and
> > >
> > > the overall temperature drift of the generalized stiffness of the semiconductor element is 50 ppm or less on a temperature range of 100° C.

Independent claim 29 recites:

29. A method for designing a micromechanical device comprising

> a semiconductor element capable of deflecting or resonating and comprising at least two regions having different material properties,
>
> drive or sense means functionally coupled to said semiconductor element,
>
> the method comprising
>
> > choosing a basic semiconductor material for the semiconductor element,
> >
> > choosing at least one n-dopant to be added to the semiconductor material,
> >
> > designing the inner structure of the semiconductor material,
> >
> > wherein said designing of the inner structure comprises determining at least two n-dopants, n-dopant concentrations and/or crystal orientations of n-doped material, and their relative volumes in the distinct regions of the semiconductor element so that the overall temperature drift of the generalized stiffness of the semiconductor element is less than 50 ppm.

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II. LEGAL PRINCIPLES

Claim construction is a question of law for the court. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 384 (1996). "The purpose of claim construction is to determine the meaning and scope of the patent claims asserted to be infringed." *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008). "When the parties raise an actual dispute regarding the proper scope of the[] claims, the court, not the jury, must resolve the dispute." *Id.* However, claim construction need only "resolve the controversy"; it is not "an obligatory exercise in redundancy" where no dispute exists. *Id.* at 1361; *Vivid Techs., Inc. v. Am. Sci & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

A. The Ordinary Meaning Construction

Claim terms are generally given the "ordinary and customary meaning" that they would have to a person of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc). The ordinary and customary meaning is not the meaning of the claim term in the abstract. *Id*. at 1321. Rather, it is "the meaning to the ordinary artisan after reading the entire patent." *Id.*; *see also Trs. of Columbia U. v. Symantec Corp.*, 811 F.3d 1359, 1364 (Fed. Cir. 2016) ("The only meaning that matters in claim construction is the meaning in the context of the patent.").

To determine the ordinary meaning, the court examines the claims, specification, and prosecution history of the patent, which form the "intrinsic evidence" for claim construction. *Phillips*, 415 F.3d at 1313; *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). "[T]he context in which a term is used in the asserted claim can be highly instructive." *Phillips*, 415 F.3d at 1314. Additionally, "[d]ifferences among claims can also be a useful guide in understanding the meaning of particular claim terms." *Id*. However, a person of ordinary skill in the art is "deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* at 1313. The specification "is always highly relevant to the claim construction analysis" and usually "dispositive." *Id*. at 1315 (quoting *Vitronics*, 90 F.3d at 1582). Nevertheless, it is improper to limit the claimed invention to the preferred embodiments or to import limitations from

the specification unless the patentee has demonstrated a clear intent to limit claim scope. *Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1381 (Fed. Cir. 2009).

In addition to the claims and specification, the prosecution history may be used "to provide[] evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317. "Any explanation, elaboration, or qualification presented by the inventor during patent examination is relevant, for the role of claim construction is to 'capture the scope of the actual invention' that is disclosed, described and patented." *Fenner Inv., Ltd. v. Cellco P'ship*, 778 F.3d 1320, 1323 (Fed. Cir. 2015). Finally, a court may consider extrinsic evidence—such as dictionaries, inventor testimony, and expert opinion—if it is helpful. *Phillips*, 415 F.3d at 1319. However, extrinsic evidence "is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Id.*

There are two exceptions to the ordinary meaning construction: "1) when a patentee sets out a definition and acts as his own lexicographer," and "2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comp. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (citing *Vitronics*, 90 F.3d at 1580). To act as a lexicographer, the patentee "must 'clearly set forth a definition of the disputed claim term' other than its plain and ordinary meaning." *Id.* (quoting *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). To disavow claim scope, the specification or prosecution history must "make[] clear that the invention does not include a particular feature" even though the language of the claims "might be considered broad enough to encompass the feature in question." *Id.* at 1366 (quoting *SciMed Life Sys., Inc. v. Adv. Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001)).

B. Means-Plus-Function Terms

Under 35 U.S.C. § 112 ¶ 6, a patentee may express a claim in terms of means or steps for performing a specified function "without the recital of structure, material, or acts in support thereof." Such means-plus-function claims must be construed "to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. § 112 ¶ 6. To construe means-plus-function claims, the court must first determine if section 112

paragraph 6 applies. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). Generally, the use of the term "means" creates a presumption that it does. *See id.* at 1349. The absence of the term "means" creates the opposite presumption. *Id.* A party may overcome the presumption by showing that the claims recite (or do not recite) "sufficiently definite structure" to adequately perform the claimed function. *Id.*

If means-plus-function applies, the court engages in a two-step inquiry to construe the claims: first, "[t]he court must identify the claimed function, and second, "the court must determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Id.* at 1351. A structure corresponds to the claimed function if "the specification or prosecution history clearly links or associated that structure to the function recited in the claim." *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012) (quoting *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997)). The structure must be adequate to perform the function; if the intrinsic evidence fails to disclose adequate corresponding structure, the claim is indefinite. *Id.* at 1311-12.

III. CLAIM CONSTRUCTION

A. "at least two regions having different material properties"

VTT's Proposed Construction	Sentius' Proposed Construction	Court's Construction
at least two regions within the semiconductor element having different material properties	two or more regions that are formed of either (i) distinct regions with different material properties or (ii) a gradient of one or more continuously varying material properties, the regions being designed so that the temperature coefficients of the materials for the regions cancel each other to the claimed level	at least two regions within the semiconductor element having different material properties

The term "at least two regions having different material properties" appears in claims 1 and 29 of the '643 Patent. The parties dispute whether the regions (1) must be included within the semiconductor element, (2) must be "distinct or continuously varying" in their material properties,

and (3) must be "designed so that the temperature coefficients of the materials for the regions cancel each other out to the claimed level." The Court addresses each dispute in turn.

First, VTT plausibly argues that the regions must be within the semiconductor element. The claims recite "a semiconductor element . . . comprising at least two regions having different material properties." ('643 Patent at claims 1, 29.) The word "comprising" has a standard meaning in patent law as "including but not limited to." *Exergen Corp. v. Wal-Mart Stores, Inc.*, 575 F.3d 1312, 1319 (Fed. Cir. 2009) (citing *CIAS, Inc. v. Alliance Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007)). Thus, the ordinary meaning of the claims suggest that the semiconductor element includes the regions but may also include other elements. SiTime does not suggest otherwise but argues that the "the overall language of independent claims 1 and 29" shows that the regions must add up to the entire semiconductor element. The Court sees no such evidence for SiTime's interpretation—the term "comprising" clearly indicates that the semiconductor element may include elements other than regions.[3] Accordingly, the Court finds that the regions must be within the semiconductor element.

Second, the parties dispute whether the "material differences" between the regions must be distinct or form a continuous gradient; but whether a genuine dispute exists is unclear. As described by SiTime, "distinct" and "continuous" are the only possible ways for regions to differ. If so, SiTime's construction implicitly acknowledges that in the existing claim requirement, the regions have "different" material properties. And if not, the semiconductor element may still comprise multiple "distinct" regions, which may form a non-continuous gradient even under SiTime's construction. SiTime argues that its construction corresponds to the two embodiments disclosed in the specification. (*See* '643 Patent at 3:27-32, 6:19-33, 11:65-67.) However, SiTime provides no reason for why the invention as a whole would not work in other configurations so as to justify limiting the claims. Absent compelling reasons, the Court does not import limitations from the specification. *Martek*, 579 F.3d at 1381. Accordingly, the "material differences"

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[3] Notably, where other components (such as the "drive or sense means") contribute to the temperature sensitivity, the specification states that the regions may "outcompensate" the effect. (*See* '643 Patent at 5:1-5, claim 25.) Elements other than regions may thus affect the temperature sensitivity without disrupting the invention.

between regions do not have to be "distinct" or formed out of a "continuous gradient."

Finally, SiTime argues that the regions must be "designed so that the temperature coefficients of the materials for the regions cancel each other to the claimed level." SiTime's argument has merit: the '643 Patent repeatedly describes its invention as based on "cancelling out" of temperature coefficients. For example, the specification states that the invention offers "significant advantages" in passive temperature compensation because "the first and second order terms of the temperature coefficients of the different materials of the semiconductor element cancel each other out to the claimed level," which "results in a significant decrease in the overall temperature drift over a wide temperature range." ('643 Patent at 5:31-46.)

The embodiments confirm that the invention works by matching slopes of temperature versus frequency (i.e., temperature coefficients) so that the effects "cancel each other out not only in some points but on a wide temperature region." (*Id*. at 6:23-33, Figs. 2a-2c.) This technique is described as the "general approach" and a non-optional part of the invention. (*Id*. at 13:40-44, 12:25-30.) Finally, the specification states that "the functionality of the invention" is that "[t]wo (or more) regions of differently doped regions of silicon can act together in such a manner that the temperature behavior of the resulting compound/effective material is the weighted sum of its constituents." (*Id*. at 15:26-30.) Taken together, these descriptions of the "invention" make clear that low temperature drift is achieved by "cancelling out" temperature coefficients among different regions so that the composite material has a stable frequency overall.[4]

Nevertheless, the Court is not convinced that this aspect of the invention is captured by the limitation requiring "regions having different material properties." Other limitations of claim 1 recite that the regions are configured so that "the temperature sensitivities of the generalized stiffness are opposite in sign at least at one temperature of the regions" and "the overall temperature drift of the generalized stiffness of the semiconductor element is 50 ppm or less on a temperature range of 100°C." Although claim 29 lacks the first of these limitations, these

[4] Notably, descriptions of the "invention" or "present invention" may limit claim scope. *See Verizon Serv. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007); *see also Techtronic Indus. Co. Ltd. v. Int'l Trade Comm'n*, 944 F.3d 901, 907 (Fed. Cir. 2019).

limitations plausibly read to capture the "cancelling out" effect. SiTime does not argue otherwise, but, on the contrary, contends that its construction clarifies the "inherent" features of these limitations. Accordingly, the Court finds that SiTime's construction is properly captured by other limitations of claim 1, not the limitation requiring "regions having different material properties."[5]

For the foregoing reasons, the Court construes "at least two regions having different material properties" as "at least two regions within the semiconductor element that have different material properties."

B. "being configured so that the temperature sensitivities of the generalized stiffness are opposite in sign at least at one temperature for the regions"

VTT's Proposed Construction	Sentius' Proposed Construction	Court's Construction
being configured so that, at least at one temperature, the generalized stiffness of one region is increasing with increasing temperature and the generalized stiffness of a second region is decreasing with increasing temperature	designed to ensure the temperature coefficients of the effective elastic modulus of the at least two regions are of opposite sign [at least at one temperature]	being configured so that, at least at one temperature, the generalized stiffness of one region is increasing with increasing temperature and the generalized stiffness of a second region is decreasing with increasing temperature, and vice versa for decreasing temperature

The term "being configured so that the temperature sensitivities of the generalized stiffness are opposite in sign at least at one temperature for the regions" appears in claim 1 of the '643 Patent. Claim 1 recites that "the relative volumes, doping concentrations, doping agents, and/or crystal orientations" of the regions are configured so that the temperature sensitivities "are opposite in sign" and the overall temperature drift is below 50 ppm on 100 °C.

The Court discerns no genuine dispute between the parties' proposed constructions.

[5] The parties dispute whether "at least two regions having different material properties" has a plain and ordinary meaning disclaimed in the specification. The Court does not find that "different material properties" has a plain and ordinary meaning—on the contrary, its meaning is unclear in the context of the specification. However, both parties use those words in their constructions without requesting clarification, so the Court does not address this ambiguity. *See GPNE Corp. v. Apple Inc.*, 830 F.3d 1365, 1372 (Fed. Cir. 2016). SiTime's disclaimer argument is insufficiently developed to demonstrate clear and unmistakable disavowal of any features.

Although VTT focuses on generalized stiffness, while SiTime focuses on temperature coefficients of the effective elastic modulus, SiTime's expert acknowledges that "[o]ne of ordinary skill would understand the 'generalized stiffness' of the semiconductor element to be similar to its 'elastic modulus,'" which are both "functions of the elastic parameters." (Nguyen Decl. ¶ 31.) Moreover, SiTime agrees that "temperature sensitivities of the generalized stiffness" should be construed as "the variation of the generalized stiffness as temperature changes due to the influence of temperature on the elastic parameters of the semiconductor material for a given resonant mode." Finally, although SiTime seeks to construe "being configured so that" as "designed to," it does not contend that subjective intent matters for infringement, as VTT objects.[6]

Thus, at the claim construction hearing, SiTime agreed to VTT's proposed construction with the modifications that (1) the generalized stiffness of the second region decreases "in an equal and opposite amount" when the generalized stiffness of the first region increases, and (2) the construction accounts for the scenario where temperature decreases by including "and the generalized stiffness of the one region is decreasing with decreasing temperature while the generalized stiffness of the second region is increasing with decreasing temperature in an equal and opposite amount."

As an initial matter, the Court finds that VTT's construction—accepted by SiTime—accords with the ordinary meaning of the term. The specification expressly defines the term "opposite in sign": it states that "[a]ccording to one embodiment, the temperature sensitivities of the generalized stiffness are of opposite [sign] generally throughout said temperature range . . . . *That is*, in a region where one of the regions has a positive temperature coefficient, another region has a negative coefficient." ('643 Patent at 3:33-38 (emphasis supplied).) VTT's construction—which requires the generalized stiffness of one region to increase with increasing temperature, while the other region is decreasing—accords with the ordinary meaning of positive temperature coefficients (increasing with increasing temperature) and negative temperature coefficients

[6] "Configured to" has a standard meaning in patent law similar to "adapted" or "designed to." *In re Man Machine Interface Techs. LLC*, 822 F.3d 1282, 1286 (Fed. Cir. 2016).

(decreasing with increasing temperature).[7] The Court thus examines SiTime's additions to determine if they warrant augmenting VTT's ordinary meaning construction.

SiTime's proposal that the generalized stiffness decreases "in an equal and opposite amount" stems from the same argument it made for "at least two regions having different material properties." Specifically, SiTime argues that the invention of the '643 Patent lies in the regions' temperature sensitivities cancelling out to produce stable resonant frequency for the composite material. SiTime thus proposes "equal and opposite amount" to capture this cancelling out effect. The Court agrees that, for the reasons stated above, the "cancelling out" effect is the "general approach" and "functionality" of the invention.

Nevertheless, SiTime has not shown that the temperature coefficients must be exactly equal and opposite for the "cancelling out" effect to work. In particular, the specification explains that the different regions may have different weights, such that the compound resonator frequency is the *weighted* sum of the regions' resonator frequencies. ('643 Patent at 12:44-13:5, 13:25-39; *see also id.* at 15:26-38.) For example, the first region (material) may be larger than the second region or may be located in a portion of the semiconductor element that contributes more to the generalized stiffness. (*Id.* at 12:51-67, 13:31-39.) Moreover, there may be more than two regions such that the "cancelling out" function depends on the combined effects of multiple regions simultaneously. (*Id.* at 13:1-5.) In these embodiments, the overall temperature effect may "cancel out" even if no two regions' temperature coefficients are exactly equal and opposite. Accordingly, SiTime has not shown that any two regions must have exactly equal and opposite temperature coefficients to produce the described effect.[8] In light of the clear claim language and statements in

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[7] The "temperature coefficient" in the specification refers to the temperature coefficient of frequency (not stiffness), which is the "usual[]" expression of temperature sensitivity. (*See* '643 Patent at 3:16-20, 1:23-24.) Both parties seek to change the focus to stiffness. Although not entirely true to the intrinsic evidence, the parties' construction accords with the ordinary meaning because the specification explains that the temperature coefficient of frequency is driven primarily by the "thermal coefficient of stiffness." (*See id.* at 14:7-38.)

[8] During the claim construction hearing, VTT argued that the "cancelling out" effect may be achieved in just this way without having two regions exhibit exactly opposite and equal temperature behavior. SiTime agreed and proposed that the regions be decreasing in a "generally" equal and opposite amount. Because the Court cannot determine the meaning of "generally" in this context, it declines to adopt SiTime's revised proposal.

the specification, the Court declines to add this requirement.

Finally, SiTime argues that VTT's construction should be expanded to account for the scenario where temperature is decreasing. SiTime's proposal appears to be plausible; temperature drift presumably occurs in both directions, not merely where the temperature is increasing. VTT does not substantively object. To avoid overlong constructions, the Court modifies SiTime's proposal to "and vice versa for decreasing temperature."

Accordingly, the Court construes "being configured so that the temperature sensitivities of the generalized stiffness are opposite in sign at least at one temperature for the regions" as "being configured so that, at least at one temperature, the generalized stiffness of one region is increasing with increasing temperature and the generalized stiffness of a second region is decreasing with increasing temperature, and vice versa for decreasing temperature."[9]

C. "the overall temperature drift of the generalized stiffness of the semiconductor element is less than 50 ppm"

VTT's Proposed Construction	Sentius' Proposed Construction	Court's Construction
the total variation (including first and higher order responses) of the generalized stiffness of the semi-conductor element from changes in the temperature of the semiconductor element is less than 50 ppm over a temperature range of the semiconductor element that extends at least 100 °C	The claim is indefinite because the phrase "temperature drift" of the generalized stiffness of the semiconductor element does not include a temperature range. Alternatively: the maximum variation over temperature of the effective elastic modulus of the semiconductor element is less than 50 ppm over any and all temperature ranges	the total variation (including first and higher order responses) of the generalized stiffness of the semi-conductor element from changes in the temperature of the semiconductor element is less than 50 ppm over a temperature range of the semiconductor element that extends at least 100 °C

[9] The parties' construction varies from the claim language in requiring only two regions to be opposite in sign (while the claim requires opposite in sign "for the regions," which may be more than two). Additionally, the parties' construction appears to account for only the first order temperature coefficient, while the specification states that second order temperature coefficients (and "optionally" third) also cancel out. ('643 Patent at 5:33-40.) Accordingly, although there is no current dispute, the Court may revisit this construction "as its understanding of the technology evolves." *Pfizer, Inc. v. Teva Pharma., USA, Inc.*, 429 F.3d 1364, 1377 (Fed. Cir. 2005).

The term "the overall temperature drift of the generalized stiffness of the semiconductor element is less than 50 ppm" appears in claim 29 of the '643 Patent. The parties dispute whether the Court may correct this claim to insert a temperature range in order to avoid indefiniteness. The parties secondarily dispute the proper temperature range to be inserted.

A district court may correct an "obvious" error in a patent. *CBT Flint P'ners, LLC v. Return Path, Inc.*, 654 F.3d 1353, 1358 (Fed. Cir. 2011) (citation omitted). An error is obvious if it is apparent from the face of the patent. *H-W Tech., L.C. v. Overstock.com, Inc.*, 758 F.3d 1329, 1333 (Fed. Cir. 2014) (citing *Grp. One, Ltd. v. Hallmark Cards, Inc.*, 407 F.3d 1297, 1303 (Fed. Cir. 2005)). Even if an error is obvious, the Court may only correct the patent if "(1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims."[10] *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003). The error and the correction are both evaluated from the perspective of one of ordinary skill in the art. *Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1353 (Fed. Cir. 2009).

Here, the error of the omitted temperature range is obvious from the face of the '643 Patent. The specification indicates that the term "temperature drift" is defined as "on/over a temperature range." ('643 Patent at 3:16-17.) Every example of temperature drift in the claims and specification also includes a temperature range. (*See, e.g.*, *id.* at 1:27-28, 3:7-11, 7:16-19, 8:8-9, claim 1, claim 6, claim 30.) The parties' experts agree that temperature drift is ordinarily expressed with reference to a temperature range. (Nguyen Decl. ¶ 34; Dkt. No. 44-1 ("Meinhart Decl.") ¶ 50.) Because claim 29 does not include a temperature range, a person of ordinary skill in the art would find the error obvious from the face of the patent.

[10] VTT suggests that the correction may come from the prosecution history itself, citing *Hoffer v. Microsoft Corp.*, 405 F.3d 1326 (Fed. Cir. 2005). In *Hoffer*, the court found that an obvious administrative error involving claim numbering could be fixed based on the prosecution history. *Id.* at 1331. However, in cases involving substantive changes, the Federal Circuit has required the claims and specification to supply the correction, which the prosecution history merely confirms. *See Grp. One*, 407 F.3d at 1303 (noting scenario where missing code omitted during prosecution could not be re-added because it was not evident from the face of the patent); *see also Novo*, 350 F.3d at 1357 (requiring a correction to be not subject to reasonable dispute based on the "claim language and specification").

SiTime disagrees and argues that the claim reads grammatically without the temperature range. Grammar, however, is not the standard for finding an error obvious. In *Ultimax*, the court found that a chemical formula missing a comma had an obvious error subject to correction by the district court. 587 F.3d at 1353. Although the formula was apparently grammatical, the missing comma would have obvious to a person of ordinary skill in the art because the written formula "corresponds to no known material" and "one of ordinary skill in the art would know that the formula should contain a comma." *Id*. Similarly, a person of ordinary skill here would know that the temperature range is missing because temperature drift "is defined in terms of the temperature range over which it is to be determined." (Nguyen Decl. ¶ 34.) SiTime cites *H-W Technology* for the proposition that an error is not obvious where the claim "reads coherently," but coherence must also be evaluated from the perspective of one of ordinary skill in the art. 758 F.3d at 1333. Even if a lay person would find claim 29 coherent without a temperature range, a person of ordinary skill in the art would not.

Since the error is obvious, the Court next examines whether the correction is "subject to reasonable debate" based on the claims and specification. *Novo*, 350 F.3d at 1357. Dependent claim 30, which depends on claim 29, recites that "the overall temperature drift of the generalized stiffness of the semiconductor element is less than 10 ppm on the temperature range of 100°C." ('643 Patent at claim 30.) VTT convincingly argues that the use of the "*the* temperature range of 100 °C" in claim 30 refers to the missing antecedent basis in claim 29, which would then also be 100 °C. VTT further argues (less convincingly) that other claims contain a 100 °C temperature range. (*Id*. at claims 1, 6.) Although this does not indicate that the same range must be present in claim 29, it does suggest that 100 °C may be a standard temperature range used by the invention. *See H-W*, 758 F.3d at 1333. Accordingly, the claim language plausibly suggests that claim 29 should be corrected to include a 100 °C temperature range.

Turning to the specification, the '643 Patent generally uses 100 °C to describe the embodiments and experimental results.[11] For example, it states that in one embodiment described

[11] Because every claim does not need to cover every embodiment, the presence of embodiments using 100 °C does not conclusively demonstrate that claim 29 has that limitation.

with similar language to claim 29, the drift of the temperature sensitivity of the generalized stiffness is "less than 50 ppm, in particular less than 10 ppm on a temperature range of 100 °C." ('643 Patent at 5:1-20.) Elsewhere, the specification also uses a 100°C to describe embodiments and experimental results achieved with the invention. (*See, e.g.*, *id.* at 7:17-18, 8:25-27, 8:42-44, 8:63-64, 9:53-55, 11:7-14, 11:34-35.)[12] However, the specification also states that "[i]t has been found that it is possible to provide [with the invention] even devices in which the overall temperature drift of the generalized stiffness of the semiconductor element is 50 ppm or less on a temperature range of 300°C or even wider ranges." (*Id.* at 3:8-11.) The specification thus expressly contemplates temperature ranges wider than 100 °C for the invention.

The question then is whether the broadening statement in the specification creates "reasonable debate" as to the range intended for claim 29. On balance, it does not. The claims make clear that the missing antecedent basis in claim 30 requires a 100 °C temperature range in claim 29. Although the specification suggests wider ranges are possible, the experimental results only describe temperature drift for a 100 °C temperature range. Broader ranges are therefore not apparently enabled. SiTime's argument that the proper temperature range should include "any and all" temperature ranges is also not supported. In particular, the specification states that the prior art had achieved temperature compensation "only over temperature ranges which are often too narrow for e.g. consumer electronics use." (*Id.* at 2:44-46.) The invention of the '643 Patent thus presumably relates to temperature drift over wider temperature ranges that would be suitable for consumer electronics use, not "any and all" ranges.

Overall, the Court finds that the claims and specification leave no room for reasonable debate that the missing temperature range in claim 29 is 100 °C. Having determined that the claims and specification supply the correction, the Court also finds that the prosecution history

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See Pacing Techs., LLC v. Garmin Int'l, Inc., 778 F.3d 1021, 1026 (Fed. Cir. 2015). Instead, those embodiments may be covered by claim 1, which specifically recites a 100 °C range.

[12] VTT also cites descriptions of poor temperature drift in the prior art using 100 °C temperature ranges. (*See, e.g.*, '643 Patent at 1:19-28, 1:61-2:2.) Although less probative than descriptions of the invention, these disclosures suggest that 100 °C may be a standard range used for comparisons in the '643 Patent.

does not suggest a different interpretation. On the contrary, the file history confirms that claim 29 originally contained a 100 °C temperature range, but that the examiner inadvertently left out the range when separating claims 30 from claim 29. (*See* Dkt. No. 44-4 ("Prosecution History Excerpts") at 29-30, 33-35.) The prosecution history thus confirms that 100 °C is the correct temperature range to be inserted into claim 29.

For these reasons, the Court corrects claim 29 to append the words "over a temperature range of the semiconductor element that extends at least 100 °C" and finds that the claim is not indefinite for lack of a temperature range.[13]

D. "drive or sense means"

VTT's Proposed Construction	Sentius' Proposed Construction	Court's Construction
"drive means" refers to a class of devices that actuate the semiconductor element, such as a transducer that provides time-varying electrical, mechanical, optical, piezo, or magnetic forces, causing it to oscillate at or near its resonant frequency. "sense means" refers to a class of devices that detect the movement of the semiconductor element, such as a transducer that measures electrical, mechanical, optical, piezo, or magnetic signals over time	The "drive or sense means" is a means-plus-function limitation. The construction of this limitation is governed by 35 U.S.C. § 112(f).	35 U.S.C. § 112 ¶ 6 applies The claims are indefinite.
Alternatively, should the Court find that "drive or sense means" is a means-plus function limitation:		

[13] The Court recognizes contrary authority. In *Rembrandt Data Technologies, LP v. AOL, LLC*, the patentee urged the court to insert "transmitter section for" into independent claims based on missing antecedent basis in the dependent claims. 641 F.3d 1331, 1339 (Fed. Cir. 2011). The Federal Circuit declined because the correction would "substantively re-draft [the] claims." *Id.* Although the patentee argued that the error would have been clear to a person of ordinary skill in the art, the court noted that the correction was "not minor, obvious, free from reasonable debate or evident from the prosecution history." *Id.* at 1339-40. However, unlike *Rembrandt*, the correction here is evident from the prosecution history, not merely the missing antecedent basis.

<u>Function</u>: The "drive or sense means" either (i) drives the semiconductor element, (ii) senses the semiconductor element, or (iii) drives and senses the semiconductor element.	**<u>Function</u>**: The claimed "drive or sense means" performs the function of (i) driving the semiconductor element capable of deflecting or resonating, (ii) sensing the semi-conductor element capable of deflecting or resonating, or (ii) driving and sensing the semiconductor element capable of deflecting or resonating.	**<u>Function</u>**: (i) driving the semi-conductor element capable of deflecting or resonating, (ii) sensing the semi-conductor element capable of deflecting or resonating, or (ii) driving and sensing the semiconductor element capable of deflecting or resonating.
<u>Structure</u>: The structure includes devices that actuate the semiconductor element, such as a transducer that provides time-varying electrical, mechanical, optical, piezo, or magnetic forces, causing it to oscillate at or near its resonant frequency. The structure also includes devices that detect the movement of the semiconductor element, such as a transducer that measures electrical, mechanical, optical, piezo, or magnetic signals over time	**<u>Structure</u>**: Defendant respectfully contends there are no structures, acts, or materials disclosed in the '643 patent specification that correspond to this claim term's recited function.	**<u>Structure</u>**: The specification discloses "transducers" for performing the driving function, but *not* the sensing function.

The term "drive or sense means" appears in claims 1 and 29 of the '643 Patent. The parties dispute whether this term is subject to 35 U.S.C. § 112 ¶ 6 (means-plus-function). If it does, the parties agree that the function of the "drive or sense means" involves "driving" and/or "sensing" the semiconductor element, but dispute whether the specification links that function to structure in the specification.

The use of the term "means" creates a rebuttable presumption that means-plus-function applies. *Williamson*, 792 F.3d at 1348. A party may rebut that presumption[14] by demonstrating

[14] The parties dispute their relative burdens on this issue. A party wishing to rebut the presumption that Section 112 ¶ 6 applies (here, VTT) must do so through the preponderance of the evidence. *Apex Inc. v. Raritan Comp., Inc.*, 325 F.3d 1364, 1371-72 (Fed. Cir. 2003). Failure to do so means the presumption prevails. *Id.* However, SiTime bears the ultimate burden to show that the claims are indefinite by clear and convincing evidence. *See id.*; *TecSec, Inc. v. Int'l Bus. Mach. Corp.*, 731 F.3d 1336, 1349 (Fed. Cir. 2013).

that the claims themselves recite sufficient structure. *Id.* Specifically, a party may show that "the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Id.* For example, in *TecSec, Inc. v. International Business Machines Corp.*, the court found that Section 112 ¶ 6 did not apply to "system memory means" because "system memory" connotes specific structure that performs the "storing data" function of the claims. 731 F.3d at 1347; *see also Skky, Inc. v. MindGeek, s.a.r.l.*, 859 F.3d 1014, 1020 (Fed. Cir. 2017) (finding "wireless device means" was not means-plus-function because a "wireless device" is "used in common parlance . . . to designate structure").[15]

Here, "drive or sense means" is presumptively subject to Section 112 ¶ 6. The intrinsic evidence does not suggest otherwise. The specification states that "[t]he devices according to the invention can be actuated with drive, i.e., transducer means known per se." ('643 Patent at 7:48-49.) The use of "i.e." suggests that drive may be used as a synonym for a transducer. However, there is no corresponding structure for "sense." The specification also states that the "transducer means" may comprise "a piezoelectric actuator element" or "electrostatic actuator means." (*Id.* at 7:51-54; *see also id.* at 4:64-67 ("The drive or sense means may comprise e.g. piezoelectric drive or sense means arranged in mechanical contact with the semiconductor element. Electrostatic actuation can be used too."), claims 21-22, 24-25.) "Piezoelectric" and "electrostatic" appear to describe how the functions are performed—specifically, the type of "force" used to actuate the semiconductor element. (Meinhart Decl. ¶ 56.) There is no evidence that they describe structure. Moreover, the use of "means" and "element" suggests that these terms do not already describe structure.[16] The intrinsic evidence thus fails to show that "drive or sense" connote structure.

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[15] Although *Williamson* changed the presumption for terms lacking the word "means," the converse standard was unaffected. 792 F.3d at 1349. Pre-*Williamson* cases remain good law.

[16] The specification states that drive or sense techniques are "discussed in FI 20115151," which is incorporated by reference. ('643 Patent at 7:53-55, 7:9-14.) Documents incorporated by reference cannot supply structure to a means-plus-function term. *Default Proof Credit Card Sys., Inc. v. Home Depot U.S.A., Inc. (d.b.a. The Home Depot)*, 412 F.3d 1291, 1301 (Fed. Cir. 2005). However, the Finnish application, which appears to correspond to granted patent FI 126586, describes an "excitation and measuring means" corresponding to a piezoelectric layer and an electrode layer deposited on the resonator (10, 12, 14 in Fig. 1a), while claiming a transducer separately (claim 4, element 52). These structures go far beyond the ones supplied in the '643 Patent. *See* https://patents.google.com/patent/FI126586B/en?oq=FI+20115151+.

In the absence of intrinsic evidence, VTT relies on extrinsic evidence to argue that "drive" and "sense" connote a specific class of devices. VTT cites dictionary definitions, prior art patents, and the declaration of its expert, Dr. Carl Meinhart, to argue that "drive" refers to "a class of devices that actuate the semiconductor element, such as a transducer," while "sense" refers to "a class of devices that detect the movement of the semiconductor element, such as a transducer."

First, VTT cites dictionary definitions. The Chambers Dictionary defines "drive" as "that which controls a master resonator in an oscillator." (Dkt. No. 44-6 ("Chambers Dict.") at 370.) This definition does not suggest concrete structure. Quite the opposite: it indicates that "drive" is used to refer to *anything* ("that which") for performing the driving function. The remaining dictionary definitions are also insufficient. For these remaining definitions, VTT relies on the wrong terms to support its argument—"driver" instead of "drive," and "sensor" instead of "sense." But these dictionaries are not silent about the meaning of "drive" and "sense." On the contrary, they define "drive" and "sense" as something other than a driver or sensor.

The American Heritage dictionary defines "driver" as "a machine part that transmits motion or power to another part," but "drive" as "[t]he means or apparatus for transmitting motion or power to a machine or from one machine part to another." (Dkt. No. 44-10 ("Am. Heritage Dict.") at 548.) The differing definition suggests that "driver" refers to structure (a machine part), while "drive" refers generically to any "means or apparatus" that performs the same function. The Dictionary of Computing defines "driver" as "[a]n electronic circuit . . . capable of providing large currents or voltages to other circuits connected to the driver's output," but it defines "drive" as "short for disk drive or tape drive, magnetic or optical"—an entirely different definition. (Dkt. No. 44-11 ("Dict. Of Comp.") at 160.) It also defines "sensor" as "[a]nother name for transducer," but "sense" as a verb only. (*Id.* at 456; *see also id.* at 524; Chambers Dict. at 1077.) On the whole, these dictionary definitions support application of Section 112 ¶ 6 because they show that a person of ordinary skill in the art would use the terms "driver" and "sensor" to refer to structures, but "drive" and "sense" to refer to the verb and generic meanings of these terms.

Second, VTT cites prior art patents, including patents filed by SiTime. U.S. Patent No. 7,446,619, assigned to SiTime, refers to "resonator drive and sense circuitry," which "may be

conventional well-known drive and sense circuitry" and "any micromechanical drive and sense circuitry." (Dkt. No. 44-7 ("'619 Patent") at 22:43-51.) However, this patent refers to *circuitry*, which in itself connotes structure. *See Mass. Inst. of Tech. & Elecs. For Imaging, Inc. v. Abacus Software*, 462 F.3d 1344, 1355 (Fed. Cir. 2006). If "drive and sense" already denoted structure, there would be no need to append additional terms. *See TecSec*, 731 F.3d at 1347 (finding "system memory" in "system memory means"—without more—connotes structure); *Skky*, 859 F.3d at 1020 (same for "wireless device" in "wireless device means"); *Rembrandt Data Techs., LP v. AOL, LLC*, 641 F.3d 1331, 1341 (Fed. Cir. 2011) (same for "fractional rate encoding" in "fractional rate encoding means"). As used in the patent, "drive and sense" plausibly refer to the function or operation of "circuitry," not structure. And even if "drive and sense circuitry" is well-known, that does not mean that "drive" and "sense" are names for such circuits.

The remaining prior art patents suffer from the same issues. U.S. Patent No. 6,958,566 refers to "a drive electrode structure formed at a position to allow electrostatic excitation of the resonator." (Dkt. No. 44-12 ("'566 Patent") at 2:57-59.) As with "circuitry," both "electrode" and "structure" refer to structure. U.S. Patent No. 9,319,020 refers to "drive" and "sense electrodes" and fails for the same reason. (Dkt. No. 44-14 ("'020 Patent") at 3:37-50, 5:5-6:3.) Sufficient structure exists only "when the claim language specifies *the exact structure* that performs the functions in question without need to resort to other portions of the specification or extrinsic evidence for an adequate understanding of the structure." *TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259-60 (Fed. Cir. 2008) (emphasis supplied). The use of "drive" and "sense" as adjectives modifying other structure terms thus fails to show that those terms by themselves connote structure—they just as plausibly refer to the function or operation of the structures they are modifying.[17]

Finally, VTT cites the expert declaration of Dr. Meinhart, who opines that "[o]ne of ordinary skill in the art would understand [that] 'drive means' refers to a specific class of devices,

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[17] Partly for this reason, the Federal Circuit has frequently "looked to the dictionary to determine if a disputed term has achieved recognition as a noun denoting structure." *See Lightning World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1360-61 (Fed. Cir. 2004) (listing cases), *overruled on other grounds by Williamson*, 792 F.3d 1339.

such as a transducer, that actuates the semiconductor element and causes it to oscillate at or near its resonant frequency," and "'sense means' refers to a class of devices, such as a transducer, that detects the movement of the semiconductor element." (Meinhart Decl. ¶¶ 60-61.) Dr. Meinhart's declaration is insufficient, for the reasons explained in *Diebold Nixdorf, Inc. v. International Trade Commission*, 899 F.3d 1291 (Fed. Cir. 2018). In *Diebold Nixdorf*, an expert opined that "cheque standby unit" refers to well-known structures "comprised of well-known components for holding cheques in a standby configuration pending user configuration of the deposit." *Id.* at 1300. The court gave no weight to this opinion because the definition was "purely functional" and the expert "failed to offer any structural limitations that might serve to cabin the scope of the functional term." *Id.* "In essence, [the expert] did little more than opine that a skilled artisan would understand the functional term 'cheque standby unit' to be *any* structure capable of performing the claimed function." *Id.* at 1301 (emphasis in original). The same result follows here: although Dr. Meinhart provides an example (transducers), his definitions do not limit the terms to transducers and include anything that performs drive and sense functions.[18]

At bottom, the purpose of Section 112 ¶ 6 is to prevent purely functional claiming.[19] *See Noah Sys.*, 675 F.3d at 1318. Under the statute, a patentee may claim generically any structure that achieves a function but must in return be limited to the structures disclosed in the specification. *See Med. Instr. & Diag. Corp. v. Elekta AB*, 344 F.3d 1205, 1211 (Fed. Cir. 2003). Here, VTT's evidence—where relevant—fails to advance the claims beyond functional claiming by defining "drive" and "sense" as anything under the sun ("that which") that performs drive or sense functions. These are exactly the circumstances where Section 112 ¶ 6 must apply to limit the scope of the claims.

[18] Some structures may, of course, derive their name from their functions. *See Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996) (noting that "screwdriver," "filter," and "lock" all derive their names from their functions). However, the expert must still provide *something*—be it typical structural characteristics, examples where the term is used as a noun, or something else—to take the opinion beyond *ipse dixit*.

[19] Congress enacted Section 112 ¶ 6 in response *Halliburton Oil Well Cementing Co. v. Walker*, 329 U.S. 1 (1946), which rejected some functional claiming as overbroad and ambiguous. *See Valmont Indus., Inc. v. Reinke Mfg. Co., Inc.*, 983 F.2d 1039, 1042 (Fed. Cir. 1993). Congress intended the statute to allow functional claiming made definite by the statute's requirements. *Id.*

Having determined that means-plus-function applies, the Court examines the intrinsic evidence for structures linked to the "drive" and "sense" functions. As explained above, the specification clearly links the "drive" function to a transducer. ('643 Patent at 7:48-52; *see also id.* at 6:45-46.) However, there is no corresponding structure linked to the "sense" function. (*See id.* at Abstract, 3:12-14, 4:64-67, 5:1-5 (referring to "sense means" without linking to structure).) Because the specification does not link any structure to the "sense" function, the structure for the "drive" function cannot supply it. *See Noah*, 675 F.3d at 1318-19. Accordingly, the specification fails to disclose adequate structure to perform all of the claimed functions, the claims are indefinite.[20] *See Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1374 (Fed. Cir. 2015); *Williamson*, 792 F.3d at 1351-52.

IV. CONCLUSION

For the reasons stated herein, the Court finds all asserted claims of the '643 Patent containing the "drive or sense means" limitation indefinite. The Court further corrects claim 29 to insert "over 100 °C" following "50 ppm." Finally, the court adopts the following constructions:

Claim Term	Construction
at least two regions having different material properties	at least two regions within the semiconductor element having different material properties
being configures so that the temperature sensitivities of the generalized stiffness are oppose in sign at least at one temperate for the regions	being configured so that, at least at one temperature, the generalized stiffness of one region is increasing with increasing temperature and the generalized stiffness of a second region is decreasing with increasing temperature, and vice versa for decreasing temperature
the overall temperature drift of the generalized stiffness of the semiconductor element is less than 50 ppm	the overall temperature drift of the generalized stiffness of the semiconductor element is less than 50 ppm over 100 °C
drive or sense means	§ 112 ¶ 6 applies

[20] VTT argues that SiTime cannot establish indefiniteness without expert testimony. But that is not required. Indefiniteness is a question of law, and a party need not present "extrinsic evidence that one of ordinary skill in the art would *fail* to understand that a term connotes a definite structure." *Diebold Nixdorf*, 899 F.3d at 1299 (emphasis in original). In any case, Dr. Nguyen supplied a declaration confirming the Court's interpretation. (*See* Dkt. No. 62.) VTT's motion to file a response to that declaration is **GRANTED** and considered. (Dkt. No. 63.)

	Function: (i) driving the semiconductor element, (ii) sensing the semiconductor element, or (ii) driving and sensing the semiconductor element. Structure: Transducer for the "driving" function No corresponding structure disclosed for the "sensing" function

This Order terminates docket number 63.

IT IS SO ORDERED.

Dated: July 9, 2020

YVONNE GONZALEZ ROGERS
UNITED STATES DISTRICT COURT JUDGE

United States District Court
Northern District of California